

# NASA TECH BRIEF



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## Computer Routine Adds Plotting Capabilities to Existing Programs

### The problem:

To devise an easy, flexible means of adding a plotting capability to new or existing FORTRAN programs. Programmers often run into problems in trying to adapt programs to provide specific plotting functions while working with a limited memory machine.

### The solution:

PLOTAN, a generalized plot analysis routine written for the IBM 7094 computer which minimizes the difficulties in adding plot capabilities to large existing programs. PLOTAN is used in conjunction with a binary tape writing routine, WRITER, which produces an intermediate binary tape. PLOTAN then edits this tape and produces a new tape which may be plotted off-line on the CALCOMP 570 digital incremental plotter.

PLOTAN has the ability to plot any variable on the intermediate binary tape as a function of any other. Flexible input techniques or data and axis labeling minimize user programming changes and their associated costly recompilations. Since only 4258 storages are required in the user's program, a minimum sacrifice of storage is required.

### How it's done:

For the user to generate the intermediate binary tape, he must compile into his program a statement of the following type: CALL WRITER (K, ICASE, A, M, NTAPE, N, MODE) where the variables in the calling sequence are controls for the routine (WRITER) which generates the intermediate binary tape. Each call to WRITER generates one logical record on the intermediate binary tape. This logical record consists of M physical records, where M is input to WRITER which is supplied by the user.

The logical record is composed of all the data which the user wishes to put on tape for a particular point.

The user may save the intermediate binary tape and process it at a later time, or, by using the CHAIN feature of FORTRAN II, he may process the tape immediately after it has been generated.

There are three distinct types of input to PLOTAN. The first of these is the intermediate binary tape consisting of N logical records. Additional input is supplied by subroutine KONST which is executed once per job and which defines input parameters or constants that are required by PLOTAN, but seldom, if ever, change. This is accomplished by defining an array, S, of dimension (400) and placing it in common storage. Both BCD (Binary Coded Decimal) and floating point variables are carried in this way. The final input to PLOTAN is provided by subroutine OVERLAY which permits any variable in the S-array to be overlaid at the start of each case. This input is optional and is used to define or redefine any member of the S-array. Thus this subroutine reads all of the input data for PLOTAN that is not "built-in" by subroutine KONST. If all required S's are already defined in KONST, no additional input (other than blank cards) is required.

Using these three inputs, the main routine, PLOTAN, edits the intermediate tape and the desired plotting information is written out on an input tape according to the very rigid format specifications required by the CALCOMP 570 plotter. This tape is then plotted by the CALCOMP off-line plotter.

This routine includes the ability to plot any variable in the binary tape as a function of any other and also has the ability to modify labels and control variables by the use of the OVERLAY technique. In

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addition, the program may be used independently to process the intermediate tape or as a second link of a CHAIN job. This eliminates the storage problems normally associated with the incorporation of plotting capability into a large routine.

**Notes:**

1. A report, entitled "PLOTAN, A Generalized Plot Analysis Routine for the 7094," by Jerry S. Linnekin and JoAnne C. Harris, X-513-65-344, August 1965, and published by Goddard Space Flight Center, Greenbelt, Maryland, contains a listing of the FORTRAN program, an explanation of its construction and use, and a number of sample plots obtained using the routine.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
Reference: B66-10511

**Patent status:**

No patent action is contemplated by NASA.

Source: Jerry S. Linnekin and JoAnne C. Harris  
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